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Local residents' perception and adaptation/coping strategies to climate-induced disasters in Bankpama, Wa West District, Ghana

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Abstract

Various studies have shown that Northern Ghana is one of the most vulnerable regions owing to climate variability. Several studies have also attempted assessing residents' perceptions and coping strategies relative to climate change in the region. However, the majority have had this done quantitatively, which often precludes vital lived experiences and opinions of affected persons. This current study sought to explore how residents of Bankpama (a drought and flood prone community) in the Upper West Region of Ghana perceive climate-related stresses, and how they deal with them. The study was conducted qualitatively on 30 respondents using Focus Group Discussions and in-depth interviews. It was established that drought, floods, storms and weather temperature were increasing in severity and frequency with drought being the most felt. While some residents had some clues about the causes of these disasters including felling of trees, bushfires and the opening of Bagre dam, others perceived them as an act of God or gods. Local residents coped and adapted by planting drought resistant crops, altering cropping calendars, rearing of livestock, going into shea butter processing, charcoal burning, planting of trees to serve as windbreaks, and depending on social networks for help.

Keywords: Local Residents, Perceptions, Climate, Disasters, Adaptation/Coping

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1. Introduction

People who rely on ecosystem services such as natural resources, particularly the poorest, are often vulnerable to climate variability and change (Morton, 2007). Climate change has the propensity of bringing considerable "change in the hazard profile and its interaction with the dynamic vulnerability and risk profiles" of countries (Prabhakar, 2009). In its fourth report, the Intergovernmental Panel on Climate Change (IPCC) estimates that global temperature will increase between 1.8°C and 4°C above the levels observed from 1980-1999 during the time frame of 2090-2099, conditional on how societies continue to develop (IPCC, 2007). The report mentioned that variations are not limited to the increase in temperature, but can also be noticed in events, such as heavy rain falls, severe drought, cyclones and rising sea levels, to mention but a few.

Research has shown that Africa is but one of the most susceptible continents to climate change as most African countries continue to experience low yield in agricultural food production due to climate change and its collateral damage (Boko et al., 2007). The Ministry of Environment, Science and Technology [MEST] (2010) of Ghana observed that climate change is a threat to Ghana's development opportunities, especially in deprived communities. MEST (2010) also maintains that "the way in which people experience climate shocks vary across different social groups, geographic locations and seasons of the year, with men, women and children all experiencing different levels of hardships and opportunity in the face of climate change".

For their part, Boissière et al. (2013) maintain that there is the need to comprehend how people experience and respond to climate variability to guide change adaptation mechanisms. In support, Berkes et al. (1995, 2000) also posit that rural folks already wield in-depth knowledge on local climate variability and change as part of their traditional ecological knowledge, that is, the knowledge acquired and transferred from generation to generation. Therefore, human perceptions have been identified as pivotal elements of assessing intricate environments and systems, as well as relevant attitudes and behaviour in diverse disciplines. "Even though climate change may bring conditions beyond previous experience, local knowledge and perceptions remain the foundation for any local response" (Boissière et al., 2013).

While vast empirical evidence exists to explain the concept of climate change and its effects globally, there is a paucity of knowledge on how residents of flood and drought prone (hotspots) communities in Ghana perceive and deal with climate associated stresses such as drought, flood, storms and extreme temperatures. Kusakari et al. (2014) quantitatively measured farmer-perceived effect of climate change on livelihood while Samaddar (2014) also assessed rural communities concerns for improved climate change adaptation strategies in Northern Ghana. Unfortunately, both studies were silent on how residents' of the north perceive some notable climate-related stressors (such as the aforementioned) and how they were practically dealing with them. Besides, the predominantly quantitative nature of both studies meant that peoples' lived experiences would not have been captured thoroughly, not to mention some visual evidence on the ground. While a claim could be made about similar studies conducted elsewhere outside Ghana, the fact remains that Ghana has different socio-economic, geopolitical and cultural dynamics, which means that a study of this nature in Ghana is unusual and context specific. Consequently, this study explores how residents of a climate-induced disaster prone community (Bankpama) perceive climate stresses. Further, the study examines their lived experiences as well as coping/adaptation strategies against disasters in the community as well as some constraints or challenges faced.

Principally, the motivations for the study are two folds: first, it is expected that the study will contribute to the body of literature on climate-related disasters and coping/adaption mechanisms, by providing a more in-depth understanding of the phenomena from the perspective of respondents. Current studies on the subject have dealt with these issues quantitatively hence have not effectively articulated the lived experiences of the affected persons. Second, it is anticipated that the study will provide some policy directions on how to support such affected communities to sustainably adapt and/or cope with climate change impacts based on hard facts.

2. What the literature says

2.1. Perception of climate variability and adaptability/coping strategies

"People who depend on natural resources, especially the poorest, are often particularly vulnerable to climate variability and change" (Morton, 2007). Hence, Kusakari et al. (2014) noted that peoples' perceptions should be considered in addressing socio-economic challenges though these perceptions are not often congruous with reality. They argue that perceptions have close connection with the individuals' environment, and tie either directly or indirectly with their attitude, behaviours, and ensuing end results. Boissière et al. (2013) observe that people the world over experience changes and events that impact their lives in various ways. To them, knowing how they perceive, react, and adapt/cope with "climatic changes and events is helpful in developing strategies to support adaptation to climate change" (Boissière et al., 2013).

In defining perception, Lindsay and Norman (1972) put forward that perception involves the "process by which organisms interpret and organize sensation to produce a meaningful experience of the world". In simple terms, it refers to the way we try to understand the world around us. For their part, Hartig et al. (2001) think that peoples' perceptions are based on experiences with natural and other environmental factors that differ in extent to which such perceptions are enabled. Correspondingly, Byg and Salick (2009) and Vignola et al. (2010), affirm that "local perceptions" refer to "the way local people identify and interpret observations and concepts". They contend that "even though climate change may bring conditions beyond previous experience, local knowledge and perceptions remain the foundation for any local response". Undoubtedly, perceptions have become a vital part of examining complex environments and relevant attitudes and behaviours in various disciplines (Kusakari et al., 2014).

The usefulness of perceptions in climate variability studies (especially, among farmer populations) is fast becoming noticeable globally. Juana, Kahaka and Okurut (2013) found that perception studies have been used to examine and comprehend how climate change is at local milieus and to recommend probable adaptation mechanism and public policies that match farmers' experiences and capacities to adapt. Also, Boissière et al. (2013) conclude that eliciting traditional ecological knowledge and local perceptions on climate variability can help to analyze acute events such as floods and droughts, high temperatures and their consequences on communities. They add that local people can provide more comprehensive information, based on their experience.

Besides, research has established that local perceptions of seasonality and climate variability differ generally according to village locations and surrounding ecosystems, which determine local livelihoods. Boissière et al. (2013) came out that some differences in perceptions were observed between gender and age groups, relative to their diverse activities, their traditional ecological knowledge, and experience about how their activities are affected by climate variations. Kusakari et al. (2014) note that the perceptions of respondents about climate change and its effects, particularly the increasing unpredictability of rainfall, decreasing rainfall amount, and increasing droughts, were in concurrence with scientifically observed trends and phenomena. They however, noted variations in perceptions across different groups.

Boyce (2000) found that local communities in Africa have had "well-developed traditional indigenous knowledge systems for environmental management and coping strategies, making them more resilient to environmental change". Predo (2010) adds that adaptation strategies and coping mechanism to climate-induced disasters differ in scope and magnitude depending on the impacts of events and on the vulnerability of the community and households to such future disasters. For his part, susceptibility implies understanding of the qualities of the households or community in terms of their capacity to anticipate, cope with, resist, and recover from the impacts of a natural hazard. It involves a combination of factors that determines "the degree to which someone's life and livelihood are put at risk by a discrete and identifiable event in nature or society" (Predo, 2010).

It is important to also alert at this point in time that the literature makes a clear distinction between coping and adaptive strategies. Coping mechanisms are more or less short term oriented in nature, and have to do with the daily actions engaged in by affected persons to deal with climate-related challenges; these mechanisms could be said to be reactive in nature. Contrarily, adaptation strategies have a long term outlook and are somewhat proactive or anticipatory in dealing with disasters in affected areas (Davies, 1993; Berkes and Jolly, 2002). Further, according to Berkes and Jolly (2002) and Osbahr et al. (2008), coping strategies are developed by individuals or households while adaptive mechanisms occur at the community level.

From the foregoing positions, it is quite certain that perceptions vary from person to person, based on their experiences and interactions with the environment as do coping and adaptation strategies. It is also understood that local residents' may hold differing views and/opinions (in relation to causes, effects and adaptive measures) on one particular climate-related stress experienced in an area. The literature on the subject seems to be replete with quantitative measurements of these issues hence the need to get an in-depth knowledge on how local residents (in Northern Ghana) perceive and deal with climate stressors, using a pure qualitative approach. Consequently, data from this study are expected to provide useful addenda to the existing knowledge on the abovementioned issues by studying residents' lived experiences relative to climate variability in their community.

2.2. Theoretical framework

Social scientists generally assess risk based on its perception as an important concept in comprehending and analyzing people's behavior when confronted with hazards and disasters (Bang, 2008). Plapp (2001) observes that risk perception is considered by many researchers as the process of attributing risk to an object, a situation or an action, and conceptualized within social science research as a socially constructed

process. Hence, Slovic (1992) puts forward that the response of people and social groups to natural hazards and their opinions and preferences is influenced by their risk perception. One common theory that has been used in risk studies is the concept of Bounded Rationality. The theory was proposed by Herbert A. Simon as an alternative foundation for the mathematical modeling of decision making, as used in economics, political science and other related disciplines. The theory postulates that the choices and decisions of people when confronted with a disaster is based on their knowledge, experience or perception (Winchester 1986; Smith, 2001). It assumes that in decision making, the rationality of an individual is restricted by the information they have, the cognitive limits of their minds, and the finite amount of time available to them in the decision making process. The theory complements rationality as optimization, which views decision-making as a fully rational process of finding an optimal choice given the information present. An additional way of looking at bounded rationality theory is that because decision-maker lacks the ability and resources to arrive at the optimal solution, they apply rather their rationality only after having greatly simplified the choices available. The theory is found suitable for this current study since the study tries to assess residents' perception of climate-related disasters or risks as well as their coping and adaptive strategies. The decisions on how and what to adapt, according to the theory, may be influenced by the individual's perception, which is also influenced by their knowledge (information available) and past experiences.

3. Study setting

This study was conducted in Bankpama in the Wa West District (WWD) of the Upper West Region, Ghana. Geographically, the WWD is bordered to the north by the Nadowli District, east by Wa Municipality, south by Sawla-Tuna-Kalba District and west by Burkina Faso (Figure 1). Bankpama lies close to the banks of the Black Volta River, which takes its source from Boulé, South Western Burkina Faso (Wa West District Assembly [WWDA] 2007). Bankpama has a population of about 742 (M: 356; F: 386) according to the 2012 projection census report by the Wa West District Assembly with it main livelihood activity being agriculture.

This is reflective of the District-wide statistic of which over 90% of active workforce is into agriculture (WWDA, 2007) accounting for 80% of the districts economy (Food and Agriculture Organization [FAO], 2014). It is worth noting that agricultural activities in the District are rain fed. Only a few privilege communities engage in dry season farming mostly powered by reservoirs and mini-dams constructed by development partners (Kusakari et al., 2014). For their part, Kusakari et al. (2014) observe that most of the farming communities have limited livelihood activities during the dry seasons, thus compounding poverty conditions. Other socio-economic activities in the District include trading, fishing, charcoal burning, *pito* (local beer) brewing and shea butter processing.

Bankpama was selected from the District for this study because it happens to be one of the communities, including Baleufili, Chietanga and Zowayeli that went through some comprehensive agro-ecological, engineering, and socio-economic resilience/vulnerability under the Climate and Ecosystem Changes in Semi-Arid Africa (CECAR) Project (2012) on "Enhancing Resilience to Climate and Ecosystem Changes in Semi-Arid Africa: An Integrated Approach". The assessment also found Bankpama, which is the largest of the three

communities, the most vulnerable to climate change stresses. It is worth noting that studies have also advanced evidence of climate instability and change occurring in the Northern Region of Ghana and Bankpama is no exception to this fact. For instance, Yengoh et al. (2010) and MEST (2010) hinted on the incidence of climate-related disasters, such as floods, storms, bushfires, rising temperatures and declining precipitation in the north. A reconnaissance survey on the study area also suggests that the study community is not insulated from the aforementioned climatic stresses hence the need to deeply investigate into how residents perceive and deal with these challenges.

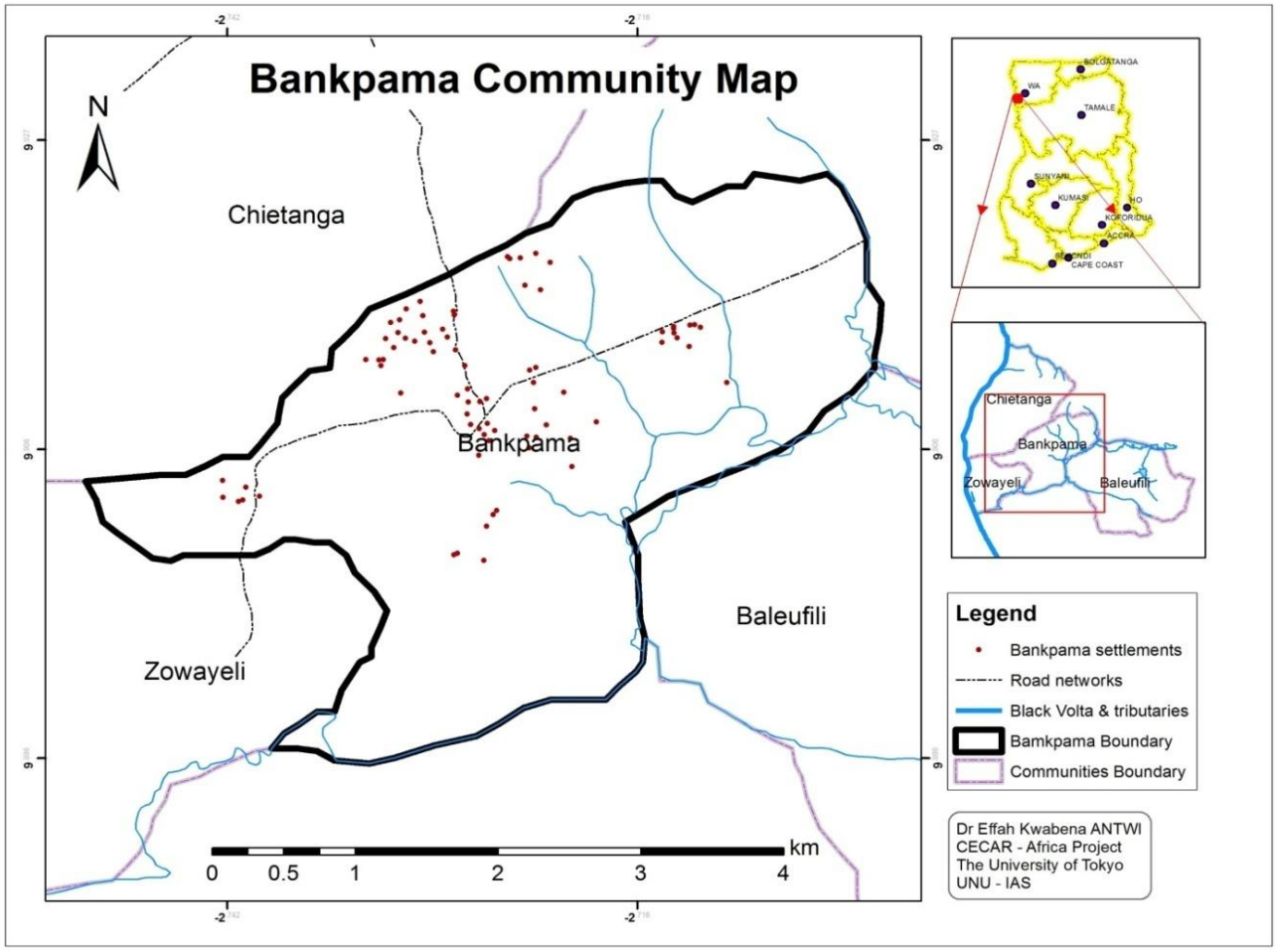

Figure 1. Map showing Bankpama (Source: CERCA Africa Project, 2014)

4. Materials and methods

The methodology adopted for this study was a qualitative approach, guided by phenomenology, which has traditionally relied on in-depth interviews to collect data (Lopez and Willis, 2004). Phenomenology involves studying the lived human phenomena within the social contexts in which the phenomena occurred and from

the perspectives of the participants (Titchen and Hobson, 2005). The aim of phenomenology is to describe the meaning of a concept or phenomenon for several individuals who have experienced it (Creswell, 2007). Through a description of the phenomenon, the researcher reduces all the individual experiences into a collective whole. This description of the essence of the phenomenon according to Creswell (2007) consists of "what" they experienced and "how" they experienced it (p. 57). With respect to the current study, the study explored residents lived experiences and perception of climate-induced disasters in their community as well as how they deal with those challenges.

The study was conducted between the months of March and April, 2014. It purposively selected 10 community elders, 10 men (young men inclusive), and 10 women (young women inclusive) from the community, and using in-depth-interviews and Focus Group Discussions, solicited people's perceptions on climate-related disasters, experiences, adaptation and coping strategies. Mainly, the tools used to guide the data collection process were an interview guide (which captured various themes, relative to the objectives of the study) and an observation checklist to guide what was observed. Various groups were represented in order to gather salient information on gendered and generational perspectives on the subject. The survey was conducted in two main languages (notably, Dagara and Brifo) understood and spoken by community members.

The qualitative approach also afforded the researchers the opportunity to observe and report on some visual evidence of climate-induced disasters, as well as the adaptation/coping strategies by the community. However, conscious of ethical standards in social science research, due permission and/or consent was sought from the people who found themselves in pictures taken before use. Consequently, the recorded data was transcribed, thematically organized, analyzed and presented in a form of narratives and pictures. It is imperative to caution at this point that the data is restricted to one community within northern Ghana hence extrapolations from the study should be done with care.

5. Results and discussion

5.1. Socio-demographic characteristics of respondents

This part of the results presents data distribution on various socio-demographic variables, such as sex, age, marital status, educational levels, occupation and religious affiliation of respondents (Table 1). Of the 30 respondents that were interviewed, more than two-thirds (66.6%) were males while 33.4% were females. As to age, 2 respondents representing 6.7% were aged below 20 years, 13.3% were between the age cohorts of 20-29 and 30-39 respectively while about half (50.0%) were aged 50 years or more. The study found that most of them were married (73.3%) while 26.7% were singles. This is not surprising because the'' majority (80.0%) were 30 years and above and are most likely to be married, especially within such a rural milieu in Ghana.

Table 1: Socio-demographic characteristics of respondents

Variables	Frequency	Percentage (%)
Sex		
Male	20	66.6
Female	10	33.4
Age		
<20	2	6.7
20-29	4	13.3
30-39	4	13.3
40-49	5	16.7
50+	15	50.0
Marital Status		
unmarried	8	26.7
Married	22	73.3
Highest Level of Education		
No formal education	20	66.6
Basic education	5	16.7
Secondary education	5	16.7
Main occupation		
Student	2	6.7
Trader	4	13.3
Farmer	24	80.0
Religious affiliation		
Islam	2	6.7
Christianity	6	20.0
Traditional religion	20	66.6
Atheism	2	6.7

Source: Fieldwork, 2014

Most (66.6%) of the interviewees had had no formal education, 16.7% had attained basic education while another 16.7% had secondary education. This finding is explainable in a sense that until quite recently, most rural areas in Ghana, hitherto, lacked schools which provide formal education to inhabitants; hence most dwellers had no opportunity of attending school in such remote parts of the country. Also, being a predominantly farming community, it was not surprising that 80.0% of the respondents were into peasant farming, 13.3% were traders while a few (6.7%) of them were students. With regard to their religious affiliation, 66.6% were traditionalists, 20.0% professed Christianity whereas only 6.7% were Muslims.

5.2. Perceptions on climate-related disasters

This section of the analyses assessed residents' perception and experiences of climate-triggered disasters (such as floods, drought, high temperatures and rainstorms) in the community. Here, views of various groups including elders, men, women and youth are presented and discussed. Some pictorial impressions are also used to support the empirical evidences from the field.

The study established that *flood* was one of the climate-related disasters plaguing Bankpama, and this agrees with other findings by Kusakari et al. (2014) and Samaddar et al. (2014) who observe that the aforementioned disasters were major hazards to the community. Interaction with the elders revealed that the frequency and severity of floods were rising. As to how they established this, they mentioned that it use to occur every three years starting from 1983, but now comes every year since 1990, whether or not there are torrential rains. They lamented the destruction of their crops and property during such occurrences. As to the cause of floods, the elders were generally uncertain. A 78 year old man had this to say:

> *"as for me, I don't know what this mystery is all about……. we need rains to water our crops so that we can get food to eat, but we don't, yet a lot of water comes all of a sudden and wash away our food crops and destroy our properties as well, why? Only God can help us……".*

The women and young women in the community also conceded that floods were occurring every three (3) years in the past, but have now become annual phenomena. They were, however, oblivious of the cause (s), except for a 23 year old girl who made an observation:

> *"hmm, I think that the world is simply coming to an end.... that is why all these bizarre things are happening to us in our community……God knows best".* [23 year old girl]

On the same subject, the men and young men held the view that the occurrence of floods was escalating, leading to destruction of crops and buildings. It was, nonetheless, interesting to note that most men and young men had a clue about the cause of the phenomenon. A 43 year old man exclaimed: ''

> *"as for floods in this community, we all know the cause; it is basically the opening of the Bagre dam upstream each year that results in the flooding of the Black Volta River, which destroys our property".* [43 year old man]

From the foregoing, it is palpable that the occurrence of ''floods was increasing and impacting negatively on the lives of inhabitants, but the exact cause, seems unknown to most residents, owing to the mixed responses adduced. While others thought it was simply an act of God, some ascribed it to the opening of the Bagre dam upstream. The latter appears to be a more plausible practical cause of the incident since the opening of the dam upstream has a high propensity of increasing the water level/volume of the Black Volta downstream, which could cause destruction to farms closer to its banks.

When it came to *drought*, the majority of respondents noted that the frequency and severity of drought were also increasing yearly, destroying crops and livestock as well as negatively affecting community livelihood in general. Further, the findings suggest that drought was perceived to be a disaster with the highest degree of impact on the community. As to what was causing drought, while some residents thought it was largely due to bushfires and felling of trees, others perceived the cause as punishment from gods and/or deities. This observation is in agreement with a similar finding by Lolig et al. (2014) and Kusakari et al. (2014) that local residents in Ghana tend to ascribe climate-related disasters to punishments meted by god and goddesses for wrongs done. For most of the respondents, the indication of the occurrence of drought is

seen in the destruction of crops and the death of many livestock especially, sheep, cattle, goats and pigs, which rely solely on fresh pastures and ponds for survival. One of the respondents made a claim that:

> *"The drought is indeed here, the weather is so hot; we use to have early rains by March through to November each year, but now, we experience early rains somewhere late April and continually have it erratically up to October. It is so severe this time that our animals and crops are dying by the day….I think we need to stop the felling of trees and the burning of bushes".* [71 year old elder]

> *A 58 year old woman similarly observed: "hmm, I can't really say why the sudden change in the raining pattern for some time now, we are suffering from this curse a lot…… we can't even get enough food and shea fruits to pick for a living because we don't have enough rains…..maybe you can tell me the reason if you know".* [58 year old woman]

> *"I risk not getting my school fees from my papa this year because nothing is likely to come from our farm because of this terrible drought. In fact, as for the beans, I am sure we won't harvest anything because we sowed quite early around March and the rains stopped for almost one month after it had germinated".* [20 year male youth]

Figure 2. Picture depicting some drought affected pumpkin leaves and corn (Source: Fieldwork, 2014)

Closely linked to the variable drought was increased weather *temperature*, which residents conceded was frequenting yearly, and they were feeling its pinch. While some linked the cause of this happening to lack of rains and also the destruction of the vegetation cover, others were oblivious about the cause (s). One this, a 30 year old woman remarked that

> *"The weather temperature changes anytime there is drought and we feel the heat on our bodies, especially in our rooms and not just that our crops and animals also die out of the severe heat that accompany the long periods of droughts".*
>
> *"I think we are to blame for some of these occurrences because we keep striping the vegetation bare by burning it….why won't we suffer this heat. I know trees give us shed which reduces the heat when it comes."* [66 year old elder]
>
> *"It is true that the weather temperature is rising, but I don't know what is causing that…..ask our parents for answers".* [37 year old woman]

The residents of the community largely could not easily comprehend why rainstorms strike them yearly amid extended drought periods. Elders, men, women and the youth alike were in the affirmative that storms were becoming severe and lots of properties loss to them annually. The majority speculated that the phenomena could be ascribed to loss of vegetation cover and felling of trees which serve as windbreaks while others thought the gods/deities were angry.

Figure 3. Picture depicting a house affected by rainstorm (Source: Fieldwork, 2014)

For almost all respondents, the phenomenon is epitomized in the ripping off of building roofs, uprooting of trees and destruction of crops. A 54 year old male elder lamented saying:

> *"Our community is really feeling the pinch of the strange strong winds lately, probably because the land is been cleared of its natural vegetation. I have to repair my roof each year because of this…….our crops in the farms are also destroyed at times".*

> *Another respondent stated that "I think the gods must be angry at us, that is why we keep on getting this punishment. We are engaging in unacceptable acts, such as having sexual intercourse in the bushes, which incur the wrath of the gods on us".* [64 year old woman]

> *"The storms are not really harsh as compared to drought though sometimes occur in this community…I say this because the rains come very late and as a result, the impact of storms are not extended to many as compared to drought".* [20 year male youth]

5.3. Adaptation and coping mechanisms against disasters

This aspect looks at the coping and adaptation strategies used by residents against the abovementioned natural disasters experienced. From the interviews conducted, a mix of both coping and adaptation strategies were revealed as mechanisms against climate-induced disasters. It was gathered from study that though residents appear very vulnerable to the aforesaid stresses, they have some strategies that help them to cope and/or adapt to them. As regards floods, there appear to be more adaptation strategies than coping strategies. It was also established that floods that occur in the community and its surroundings, largely destroy farmlands that are close to the river banks. The respondents, especially farmers who happen to have dominated the study population, noted that they adapt by avoiding valleys, and rather, farming on hilly or high lands to prevent crop inundation and destruction. A 30 year male farmer said:

> *"I know flood will always occur each year, so I simply wouldn't farm on a low land".*

> *Another avers saying: "…….if I farm on a hilly area, at least, I can still harvest something small in the event of any flood…..this is the only way out for me."* [43 year old man]

> *"The only farmland I have is located in a valley-like area and I have nowhere else to relocate to in flood. If flood comes, my crops risk destruction……I just hope it does not occur this year again".* [52 year old woman]

In relation to drought, it was observed that respondents could do very little about such occurrences in the community because of the severity with which it occurs. However, they had some interesting coping and adaptive strategies against such events though some are not sustainable in the long term if the situation persists. Some respondents adapt by changing cropping calendars and others resorted to the cultivation of

drought resistant seeds. The study confirmed that of Predo (2010) which found that farmers used crops with shorter maturation period to hedge drought. On the issue, a 71 year old elder said:

> *"Though it is not so effective a strategy, I adapt by cultivating crops with shorter maturation period (2 months) to hedge the drought…..we have some corn that can mature between one and half to two months".* [71 year elder]

> *"Crops like sorghum and rice are drought resistant….they don't easily dye when there are no rains. I have decided to put more of my resources into such crops since the rains are highly unpredictable".* [43 year old man]

Others also coped by resorting to livestock rearing in order to augment their household incomes (which depends hugely on framing), dry season gardening, game hunting, fishing, trading, shea butter processing and social networks.

> *"What I do as a woman to help my husband take care of the family in such difficult times is to go into shea butter processing and trading in order to bring food home…..but even then, the shea nuts are hard to come by owing to the prolonged droughts".* [66 year old woman]

Figure 4. Picture depicting shea butter processing as an off-farm activity (Source: Fieldwork, 2014)

"In times like this, what I do is rearing more goats and fowls so that I can sell that in the market for food, should the rains fail us……rearing help as a lot in such times. My wife also burns charcoal to supplement that which is quite helpful". [58 year old man]

A boy aged 19 years made a recall: "the last time drought stroke us, my elder brother who is in Kumasi (a capital city of one of the administrative regions in Ghana) sent some money through my aunt so we could by food…..We have to call him for help if no rains this year". [19 year old boy]

In dealing high temperatures, it was quite clear that respondents had not much practical measures against this stress than just sleeping outside their rooms at night.

A female respondent aged 20 years also mentioned that:

"my household simply copes by sleeping outside when there is so much heat, especially in March, to prevent the deadly Cerebral Spinal Meningitis disease which is occasioned by excessive heat". [20 year young girl]

For a 37 year old woman this was how she copes:

"Hmm, because of the excessive heat and the danger it poses to our health, we sleep on top of the roofs of our mud house…..it is very airy there and saves us from the disease that can twist your neck". [37 year old woman]

As to storms, the study showed that almost all the respondents had the same adaptation and coping strategies against storms. One major adaptation strategy established here was the planting of trees around houses to serve as windbreaks though according to respondents, it is not so effective a strategy due to the protracted drought experienced in the community. A 30 year old woman and a 58 year old man lamented how their effort to deal with rainstorms proved futile:

"My husband and I were sensitized to plant trees around our houses to prevent the strong winds from taking off our roof, and also to give us shed, but because we don't have enough rains our effort failed……. that is the problem". [30 year old woman]

A 58 year old man mentioned that "I also try to plant some trees to serve as windbreaks, but they eventually die-off because of the drought and its attendant heat". [58 year old man]

On the other hand, residents seemed to have had a number of coping strategies against rainstorms comprising stone bonding (to prevent zinc roofs from being ripped-off); use of social networks (especially, supports from relations, friends and social media), and praying to the God. For a 37 year old woman, this was how they succeeded in tackling rainstorms:

"For storms, the only way out is to place very heavy stones on my roof, which is very effective, but the stones sometimes destroy the roofing sheets". [37 year old woman]

Figure 5. Picture depicting stone bonding to prevent destruction by rainstorm (Source: Fieldwork, 2014)

"We have not saved any money or food, so if storms strike us, we will contact our son who is down south to help us with money to renovate the house and buy food…that is all we can do for now". [43 year old man]

"I simply pray against floods …….my house has not been affected yet, but others have experienced it". [71 year old man]

"The radio people are good since they inform the government to bring us relief items during such times……..I also hope that they hear about us when we are faced with is storms". [20 year old girl]

6. Conclusions

The study was conducted in Bankpama in the Wa West District of the Upper West Region, Ghana, to explore residents' perceptions on climate-induced risks and how they deal with them. For the purpose of

representativeness and appreciation of varied opinions, the sampling units comprised elders, men, women and youth groups in the community. The study employed the qualitative approach to research and used both interviews and Focus Group Discussions in the field data collection process.

The study concludes that residents of the community perceived flood, drought, storms and weather temperature to be increasing in severity and frequency. Most of the respondents across the various categories mentioned were quite unanimous in their opinions about the causes of climate-related disasters, especially storms and droughts. The majority also had similar coping and adaptation strategies to the stresses experienced, irrespective of gender and age. Moreover, the study also supported the Bounded Rationality theory in a sense, as the results show that people's perceptions were influenced by their past experiences and knowledge, and those perceptions also informed the kind of decisions taken to adapt or cope with climate-related stresses.

Drought and its attendant high temperature was found to be the main disaster negatively affecting lives and properties in the community due to its prolonged severity. Some residents attributed the occurrence of this phenomenon to the destruction of the vegetation while others also assigned it to punishment from God and gods. It was interesting to note that respondents had various adaptations and coping mechanisms to this catastrophe, which included planting of drought resistant crops, altering cropping calendar, rearing of livestock, shea butter processing, charcoal burning and dependence on social networks.

As to floods, a more practical cause was specified, which is the yearly opening of the Bagre Dam upstream, which may require urgent government attention and action. The study found out that residents, particularly farmers, were the most affected, but had just one adaptation mechanism which was farming on high lands, to prevent crop inundation whereas others simply left their fate to God or some gods.

Moreover, the community could hardly fathom why storms hit them yearly, despite the protracted period of droughts. While some of the respondents conjectured that it was happening due to the indiscriminate felling of trees others perceived it to be an act of God or gods. The study also realized that the community was very vulnerable when it came to storms owing to the kind of puny and poorly constructed buildings that dominated the architectural landscape and the effect of drought, which stifles the growing of trees as windbreaks. The majority of residents bemoaned their inability to counteract this phenomenon due to the high incidence of poverty which renders them incapable of building more resilient houses as well as the drought and high temperatures which scorch to death plants serving as windbreaks.

7. Research implications and recommendations

These findings clearly suggest a manifestation of the occurrence of drought in the community as confirmed by residents hence the need for various agencies, such as the National Disaster Management Organization (NADMO), NGOs and others concerned entities to dwell on the existing knowledge on this disaster and enlighten the community on what the main causes are as well as empower them to effectively deal with drought. For instance, the burning of charcoal by some residents as an alternative source of livelihood during drought has implications for environmental health and even the propensity of exacerbating other climate-

induced stresses including drought. In addition to the existing measures adopted by residents to cope and/or adapt to drought, government and development partners could improve community's resilience by setting up irrigation systems and/or dams that would support all-year-round farming in the community hence reduce the effect of drought in the community. In addition, the use affordable Liquefied Petroleum Gas (LPG) could be encouraged in this community by the government of Ghana in a bit to preventing further forests degradation. This could be done by subsidizing the cost of the product to enable the purchase by all households. Again, renewable sources of energy such as solar and biogas systems could also be installed for use by residents.

Residents, particularly farmers resort to farming on hilly areas to prevent potential destruction of crops. In spite of the fact that farming on hilly areas may be a good strategy against floods in the area, farming on such areas might affect crop yields because of the likely low moisture content resulting from prolonged drought in the area. Moreover, anecdotal evidence suggests that places such as river basins and lowlands tend to be more fertile than high lands. Therefore, it would be imperative for this community to be empowered and educated on some long term remedial measures against such a disaster in the area. For instance, the local government could take the initiative to sensitize the affected community on this disaster, and perhaps, put in place the necessary measures to evacuate residents from flood prone areas to prevent any unpredicted damage caused. This may sometimes come with great deal of resentments and contestations from community folks, but governments need to tactfully go into dialogue and negotiations in order to win hearts for such an action. However, in doing this, alternative sources of livelihoods should be provided in order not to deprive them of their livelihoods by: 1) giving out soft loans and/or start-up capitals for various ventures and 2) building their capacities in other areas that could better improve their lives than before.

Last but not least, the government or local government and other development partners could enhance the resilience of the local community against rainstorms by encouraging the planting of more trees. This is possible by supplying free or affordable seedlings to the community, as well as constant all-year-round water supply through such sources as boreholes, rainwater harvesting, hand-dug wells and mini-dams to water plants.

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